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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/691,083	10/18/2000	Milton J. Boden JR.	IR1444 Div. (2-2480)	7041
2352	7590	10/31/2006	EXAMINER	
OSTROLENK FABER GERB & SOFFEN 1180 AVENUE OF THE AMERICAS NEW YORK, NY 100368403			FOURSON III, GEORGE R	
			ART UNIT	PAPER NUMBER
			2823	

DATE MAILED: 10/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/691,083

Applicant(s)

BODEN ET AL.

Examiner

George Fourson

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-7,9 and 11-13 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-7,9 and 11-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

A new ground of rejection based on a newly cited reference is stated below.

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claim 9 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There is no antecedent basis for "interlayer dielectric".

Claims 1,3-7,9 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kinzer et al 5338693 in view of Spring et al 5831318.

Kinzer et al discloses a radiation resistant MOSFET wherein the gate oxide is formed late in the process to avoid thermal cycling (abstract and col.2, lines 23-35), which is the method disclosed by applicant to obtain a MOSFET "capable of resisting single event gate rupture due to single event effect". The reference discloses that P-channel devices are affected by radiation (col.1, lines 18-26) and that the disclosed process is useful in formation of P-channel devices although formation of N-channel devices is exemplified (col.4, lines 6-13). The process disclosed includes providing a silicon wafer with an epitaxial layer thereon (col.4, lines 13-16), implanting to form P-type body region 44 with P⁺ region 42 adjacent the upper surface (see instant claim 7), subsequent formation of a gate oxide by dry oxidation at 975°C or 1000°C (col.7, lines 57-65), formation of a gate doped with P (col.6, lines 15-24) formation of a low temperature oxide ILD (col.7, lines 4-14) and formation of source contact and passivation layer (col.7, lines 23-31). Formation of N-channel devices would entail reversal of conductivity types by definition.

The reference discloses that the gate oxide is made as thin as possible, 700-900Å, to reduce threshold shift in the presence of radiation dose (col.6, lines 1-9).

The reference does not disclose that the device is capable of resisting single event gate rupture due to single event effect".

Spring et al recognizes that in the prior art processes such as that of Kinzer et al '693 the thinnest gate oxide possible was grown but instead discloses that in a similar MOSFET including a gate oxide formed late in the process a thicker gate oxide can be used with the added benefit of making the device resistant to single event breakdown under reverse bias (col.5, lines 1-21). The reference discloses formation of a 1250-1350Å gate oxide for a device having a reverse breakdown voltage of 250-650 volts (col.5, lines 1-21). The oxide is formed in the same manner as in the process of Kinzer et al '693.

It would have been obvious to one of ordinary skill in the art to form the gate oxide of Kinzer et al to have a greater thickness than 900Å and less than 1000Å with the expectation that a functional MOSFET would be produced in view of the disclosure of Spring et al that MOSFET's having a gate oxide thickness of 1250Å are functional. It would also be expected by one of ordinary skill in the art that increasing the thickness of the gate oxide would increase the single event breakdown resistance although increasing the threshold shift due to ionizing radiation. The device would inherently be "capable of resisting single event gate rupture due to single event effect" because it would be the same device disclosed by applicant to exhibit such a property.

With respect to claims 4 and 5, the concentration of the channel region of the device of Kinzer is a result of the energy and dose of the implants to form regions 44 and 42 as well as the duration and temperature of the annealing steps subsequent to the doping steps. The concentration would correspond to the recited values in part because there is no particular correspondence recited. Further, one of ordinary

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skill in the art would have been led to the recited channel concentration through routine experimentation to achieve desired device performance including desired source/drain resistance.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to George Fourson whose telephone number is (571) 272-1860. The examiner can normally be reached on Monday through Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Smith, can be reached on (571) 272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



George Fourson
Primary Examiner
Art Unit 2823

GFourson
October 27, 2006